

**Town of Westford**  
**28 North Street**  
**RTN 3-26268**

**PUBLIC PARTICIPATION QUESTIONS**

Question No. 1:      *Recommendations to deal with this perchlorate problem should be based on what best protects Westford residents from the ill effects of perchlorate not some arbitrary level declared by a government agency.*

Response No. 1:      MassDEP has a long-standing protocol for deriving drinking water standards and that protocol was followed for perchlorate. MassDEP scientists reviewed the scientific literature and considered all of the evidence on the health effects of perchlorate. In addition, MassDEP's external scientific advisory committee provided independent scientific review to ensure that the final standard would protect the most sensitive members of the population and be based on good science.

Question No. 2:      *Most of the studies on the effects of perchlorate have been done using healthy individuals. What are the effects on people with chronic health problems? Are there any differences in the risk of exposure by groups, such as; elderly, children, pregnant women or immune compromised, like from chemotherapy?*

Response No. 2:      MassDEP's work to set a drinking water standard for perchlorate is based on a review of the scientific literature including human and animal studies. There are published studies on individuals with chronic thyroid problems who make too much thyroid hormone. When they were exposed to perchlorate, studies show that the target site for perchlorate toxicity is the thyroid gland. Laboratory studies in animals provide information on the health effects of perchlorate on the developing fetus and newborns. The data suggests the most sensitive subgroups are pregnant women, fetuses, infants, children to the age of 12, and individuals with untreated hypothyroidism. Individuals who have hypothyroidism produce low levels of thyroid hormone and are less able to protect the thyroid gland from perchlorate exposures.

The effects of perchlorate on the immune system are not well established, but studies in humans and animals indicate that the most sensitive endpoints are impacts on growth and development of fetuses and infants. MassDEP's standard is aimed at protecting the sensitive subgroups. You can tolerate higher levels of perchlorate (above 2 ppb), if you are not a member of the sensitive subgroup.

Question No. 3:      *Does perchlorate interact with any medications?*

Response No. 3:      Perchlorate could interact with any medication that alters thyroid hormone levels. For example, perchlorate may interfere with medicines used to control hyperthyroidism or hypothyroidism. Hyperthyroidism is a health condition that occurs when

your body produces too much thyroid hormone whereas hypothyroidism is when your body makes insufficient levels. You can check with your physician or pharmacist to find out if medications you are using affect thyroid hormone levels.

Question No. 4: *U.S. EPA has an advisory level of 24 ppb, California has a standard of 6 ppb, and now MassDEP first issued an advisory level of 1 ppb then raised it to 2 ppb. Who is right?*

Response No. 4: The differences in the above limits reflect how different agencies have interpreted the scientific literature and how they've addressed uncertainties. The major differences between the values are that (1) U.S. EPA's limit does not take into account the contribution of perchlorate that comes from food; (2) MassDEP allowed 80% of the reference dose (allowable dose) to come from food and only 20% to come from drinking water; (3) California allowed 60% to come from food and 40% to come from drinking water. MassDEP also incorporated a larger uncertainty factor than U.S. EPA and California to address concerns about perchlorate in breast milk and infant exposures. MassDEP's standard is more protective than US EPA's and California's, because we are concerned about food exposures and information that perchlorate can be transported into breast milk.

Question No. 5: *For over twenty years the standard on arsenic was 40 ppb and has recently been changed to 10 ppb. Is the same scenario likely to happen with perchlorate?*

Response No. 5: MassDEP's perchlorate standard is based on available science and is the strictest in the country. MassDEP updates its standards on a regular basis, to take into account new scientific information. Updating standards is important towards public health protection.

#### Questions related to Plant Uptake and Garden Produce

Question No. 6: *Several questions were raised regarding plant uptake of perchlorate from water used to irrigate gardens. Due to the common nature of these questions, a comprehensive response is provided below.*

- a) *The topic of vegetable gardens has come up several times. Are vegetables that are watered from a well with perchlorate likely to become a concentrated source of perchlorate?*
- b) *Are some vegetables likely to store perchlorate so that it becomes a higher, more concentrated source than the water itself? Please provide examples of vegetables that might.*
- c) *At what levels in well water is perchlorate likely to produce a concentrated source in food from a garden?*
- d) *Is there a level of perchlorate in water that needs to consider if watering plants producing edible fruits? Please provide examples.*
- e) *Is there a level of perchlorate in water that needs to consider if watering plants producing edible leaves? Please provide examples.*

Response No. 6: It should be noted that the U.S. Food and Drug Administration (FDA), which regulates contaminants in commercial food crops, has conducted national surveys and has reported perchlorate levels in a wide variety of commercial crops. The available scientific data indicate that the extent of uptake into food crops is highly variable, difficult to predict, and dependent on factors such as soil type, nutrients (nitrate) in soil (which reduces plants uptake), frequency and duration of water use, and perchlorate concentrations in the water. Natural rainfall will reduce the potential for perchlorate uptake as any residual perchlorate in the soil from prior watering would migrate deeper into the soil and hence not be available for uptake into plants.

FDA reported generally higher levels in leafy crops such as lettuces (green leaf, red leaf, iceberg and romaine), collards and spinach. Perchlorate levels in spinach ranged from 6 to 927 ppb. The US Environmental Protection Agency (USEPA) found that the outer lettuce leaves had 2-6 times the amount of perchlorate than the inner leaves. Studies also indicate that tomatoes, cucumbers, carrots, broccoli and green beans can take up perchlorate, but generally at lower levels than leafy vegetables.

MassDEP's Office of Research and Standards has evaluated the question about what levels of perchlorate in well water are likely to produce perchlorate levels of concern in food from a garden, including fruits and leaves. We conclude that produce grown using water containing up to 2 ppb of perchlorate would be safe to eat. Produce grown using water at levels between 2 ppb and 15 ppb, the maximum concentration detected so far in any Westford private well, could result in exposures that exceed the recommended dose for sensitive subgroups, but would be acceptable for those who are not sensitive to use. However, because the recommended dose includes adjustments designed to assure safety these exposures remain well below the levels associated with observed effects in people. As a result, although we cannot rule out a risk for sensitive individuals the probability of an adverse effect is small. Those individuals who may be particularly sensitive to perchlorate exposures (pregnant women, young children, individuals with hypothyroidism) may want to use a covered rain barrel for watering plants, limit use of the well water for irrigation or limit their consumption of produce, in particular leafy vegetables, irrigated with the well water. In addition, available information indicates the removal of the outer leaves of leafy vegetables will also reduce potential perchlorate exposures.

Question No. 7: *What risk exists to wildlife and household pets that may drink contaminated groundwater, or drink water from contaminated wells?*

Response No. 7: Studies in animals indicate that the target site for perchlorate toxicity is the thyroid gland, and the toxic effects may be similar to that of humans. You may wish to consult with your veterinarian to find out if your pet has thyroid problems. If so, as a precaution you could consider alternative water for your pets.

Question No. 8:        *My last water test in December was a 0.050 reading. What is the level required to qualify for the bottled water program?*

Response No. 8:        The laboratory testing protocol used in this recent (2007) sampling program was Method 320. This laboratory method has a detection limit of 0.050 micrograms per liter (ug/l) [Note: ug/l is essentially the same as parts per billion (ppb)]. In other words, your results were below the lowest level that the laboratory can test down to. Based on this test your well water does not contain perchlorate.

Currently, bottled water is being offered to residences where the private well water values are above the detection limit of 0.050 ug/l. Subsequently quarterly sampling is being provided to all private wells within the potential area of perchlorate contamination. If perchlorate is eventually detected during subsequent quarterly monitoring the affected resident will also be offered bottled water. This process will continue until the nature and extent of the contamination is understood.

Question No. 9:        *Are there any studies to indicate how long perchlorate remains in ground water?*

Response No. 9:        A September 1995 study outlines that perchlorate may be released into the environment in the form of different salts, including: ammonium perchlorate, potassium perchlorate, sodium perchlorate, and others. All are highly soluble in water. Perchlorate does not bind to soil particles appreciably and that the movement of perchlorate in soil is largely a function of the amount of water present. Some perchlorate may be held in solution in the vadose zone (i.e. dry soils above the groundwater table) by capillary forces.

In dilute concentrations typically found in groundwater, perchlorate behaves conservatively, with the center of mass of the plume moving at the same average velocity as the water. Dispersion will cause the contaminant front actually to move faster than the average groundwater velocity. If perchlorate is released as a high-concentration brine solution, the movement of the brine in a groundwater system may be controlled by density effects. The density contrast between the brine and groundwater may cause the brine to move vertically with minimal influence by groundwater movement and little or no dilution.

Perchlorate is kinetically very stable under environmental conditions and will not react or degrade in solution under ambient conditions. The combination of high solubility, low sorption, and lack of degradation tends to create plumes that are large and persistent. [Interstate Technology & Regulatory Council Perchlorate Team (September 2005) Interstate Technology & Regulatory Council 444 North Capitol Street, NW, Suite 445, Washington, DC 20001]

Question No. 10: *It appears that to date, the focus of sampling has been to the north and east sides of Snake Meadow Hill. There is just as much likelihood of contamination moving to the south and west sides of Snake Meadow Hill.*

Response No. 10: Following up on the original list developed by the Board of Health, CEI cross-referenced the Water Department's customer lists with the Town's property records to identify residences/property owners that are potentially on private wells around the base of Snake Meadow Hill, specifically: N. Main St., Groton Rd., Millstone Hill Rd., Cowdry Hill Rd., West St. and N. Main St., as well as adjoining side streets. These total 62 properties on wells, all have been contacted of which 40 have been sampled. Three separate mailings have been sent to this group in an attempt to collect groundwater samples.

Question No. 11: *As methods or alternatives for addressing the perchlorate contamination are being developed, cost considerations should not be included.*

Response No. 11: Both standard engineering practice and the Massachusetts Contingency Plan require cost considerations in the conduct of an alternative Feasibility Evaluation. Specifically, 310 CMR 40.0860(7) requires a Benefit-Cost Analysis of going beyond standards to achieving background, as well as the incremental cost of conducting the remedial action.

Question No. 12: *When was perchlorate first used in blasting materials. Please verify that quarrying activities on Snake Meadow Hill could have come from quarrying activities that occurred before the Town Garage was built.*

Response No. 12: Perchlorate is an additive to explosive materials first developed in the 1960s. Available records through the Westford Fire Department show that Pricella had pulled permits for blasting operations into the 1980s and 1990's, and Tresca also pulled permits for blasting in the late 1990s and early 2000. There is no specific information on the type of additive used during those times.

Question No. 13: *I'm very interested in getting the various diagrams showed where can I view these again?*

Response No. 13: All information developed as apart of this project is available at the Public Repository in the Town Library.

Question No. 14: *The letter says 'Notice of Responsibility'. Can you please clarify who is responsible if my well has perchlorate? Is it 'myself' or the 'Town of Westford'? It is not clear to me (from this letter) who has responsibility if my well has perchlorate.*

Response No. 14: MassDEP issued a Notice of Responsibility for the perchlorate contamination to both the Town of Westford and Maine Drilling & Blasting (MD&B). Under the provisions of the Massachusetts Contingency Plan (MCP) 310 CMR 40.0000, both

parties are designated as the “Potentially Responsible Parties” (PRP). The MCP requires responsible parties to take the necessary response actions in an appropriate and timely manner as outlined in the regulations. The PRPs are both jointly responsible for the assessment and cleanup of the perchlorate contamination.

Question No. 15:      *Will the Town be testing for anything else in my well water sample besides perchlorate?*

Response No. 15:      The current sampling program is designed to investigate the impact from the perchlorate contamination in drinking water. There are no other contaminants of concern from the site that warrant other analysis to be performed.

Question No. 16:      *The current sampling dates from CEI are all before the 3/18 meeting. Will there be any sampling/testing for perchlorate after the 3/18 meeting? If there was sampling after the meeting I'd prefer that since I'd have a chance to learn more specifics about the situation.*

Response No. 16:      The current quarterly sampling will be presented at the March 18<sup>th</sup> meeting. The next quarterly sampling would be set for June 2008.

Question No. 17:      *If perchlorate is found in my well \*above\* the limit deemed unsafe and (assuming) the Town of Westford is responsible, what will the town do?*

Response No. 17:      The current state drinking water standard for perchlorate is 2.0 ppb. Over the short-term, the Town is offering bottled water to any residence with a detectable level of perchlorate (Please reference Response No. 8 for additional information.). For the long-term, the Town is evaluating various options from Point of Use treatment (i.e. at the faucet) to extending a public water supply pipeline to those affected residence.

Question No. 18:      *If perchlorate is found in my well \*below\* the limit deemed unsafe and (assuming) the Town of Westford is responsible, what will the town do?*

Response No. 18:      Over the short-term, any residence with any detectable level of perchlorate is being offered bottled water (Please reference Response No. 8.).

Question No. 19:      *If the homeowner is responsible, what must they do?*

Response No. 19:      The homeowner is not responsible for existing site conditions. However, the Town is requesting individual residence in the study area for their cooperation in conducting the quarterly sampling program. Data from the quarterly sampling program will aid in understanding the migration pathways and potential impacts of the contamination.

Question No. 20:      *Are ALL vernal pools that have been previously identified going to be tested?*

Response No. 20:      A total of 18 vernal pools and flowing springs have been sampled. The focus was on those vernal pools where there appeared to be a groundwater discharge point, not just pooled snow melt.

Question No. 21:      *Other than private wells and vernal pools, what other, and how many, sites are going to be tested?*

Response No. 21:      An additional 16 surface water stream or impoundment areas have been sampled, bringing the total to 34 separate surface water bodies. The majority of the residences have deep bedrock wells. If a residence has an old abandoned but accessible dug well or a basement sump pump, they are also sampled by CEI to provide data on shallow groundwater.

Question No. 22:      *And are you going to continue to test sites that do not exhibit any perchlorate currently?*

Response No. 22:      Per MassDEP, all residential well sampling will continue until corrective actions are implemented.

Question No. 23:      *Has any hydrological study of Snake Meadow Hill been performed? If so, where are the results of that study, and if not, why not?*

Response No. 23:      Although CEI has not conducted a specific hydrologic study of Snake Meadow Hill, the current sampling program for the site includes a total of 40 residential wells (sampled quarterly), a total of 19 deep and shallow monitoring wells, and 34 streams and vernal pools. From a practical standpoint this sampling program compares to a hydrologic study, due to the multi-media sampling locations. The information on the perchlorate contamination will be provided in the April 2, 2008 Immediate Response Action (IRA) Plan submittal.

The Massachusetts Contingency Plan requires the completion of such a hydrologic study as part of the Phase II - Comprehensive Site Assessment submittal that must be completed within two years of Tier Classification (October 3, 2008) submittal for the site.

Question No. 24:      *I am concerned that if construction starts at the Graniteville Woods development that it will have an impact on the groundwater and other residential wells.*

Response No. 24:      Land development activities typically require a number of permits and approvals from regulatory agencies at the state and local levels that dictate the way in which a property may be developed. Such requirements may include federal, state and local laws, ordinances, permitting regulations, comprehensive land and development codes. These rules

must be carefully examined. Given the potential for construction activities to impact the contaminant plume, successful land planning by the developer, its consultants and the Town of Westford should be implemented to prevent site conditions from becoming worse. MassDEP will provide guidance to the Town of Westford and the developer to resolve issues with construction at that property.

State law (Massachusetts Oil and Hazardous Materials Release, Prevention and Response Act (M.G.L. c. 21E) and the MCP), contain the requirements and timeframes for completing the cleanup of releases. Provisions of the MCP (310 CMR 40.0183(2)(c)) states that should a person cause a release to become worse than it otherwise would have been, than that person may be potentially liable to M.G.L. c. 21E.